

# Revision of the myrmicine ant genus *Lophomyrmex*, with a review of its taxonomic position (Hymenoptera: Formicidae)

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**Abstract.** The myrmicine ant genus *Lophomyrmex* is fully revised and transferred from tribe Pheidologetonini to Pheidolini (tribal transfer: Pheidolini, senior synonym of Lophomyrmecini syn.n.). Ten species are recognized, which are placed into two species groups. The *quadrispinosus* group, characterized by the presence of pronotal teeth or spines, includes *birmanus*, *kali* sp.n., *opaciceps* stat.n. (= *javana* syn.n.), *quadrispinosus* (= *taprobanae* syn.n.) and *taivanae* stat.n. The *bedoti* group, in which the pronotum is dorsolaterally marginate, includes *ambiguus* sp.n., *bedoti*, *longicornis* sp.n., *lucidus* stat.n. and *striatulus* sp.n. A key to the worker caste is presented and descriptions of known sexual forms are given.

## Introduction

*Lophomyrmex* is a small, well-defined, Oriental and Indo-Australian genus. These ants have been generally overlooked, although some *Lophomyrmex* species are common ground dwellers and surface scavengers in secondary forest. Moffett (1986) briefly surveyed the foraging behaviour of *L.bedoti* and *L.opaciceps* in Malaysia and Indonesia. Nests of *Lophomyrmex* are usually located near the base of trees and seem moderately populous. *Lophomyrmex* workers forage following narrow trunk trails from which they depart singly to collect food. The more persistent pathways are surrounded by walls built with soil or sand particles; sometimes the trails are wholly subterranean and undetectable. The diet is heterogeneous and includes many kinds of dead and living invertebrates: isopods, arachnids, termites, cockroaches, flies, larvae of various insect groups, as well as other ants. Moreover *Lophomyrmex* workers are enticed by sugar baits and vegetable oil, but not at all by seeds. The peculiar mandibular dentition of *Lophomyrmex* appears well suited for cutting both prey and the limbs of foreign ants; *Lophomyrmex* are well adapted for hunting other invertebrates notwithstanding their reduced sting.

*Lophomyrmex* workers are small, slender, yellowish or brownish ants; both workers and females are easily identifiable by means of the presence of the following autapomorphies: (a) mandibles armed with an apical and one preapical tooth, followed, on both masticatory and

basal margin, by an uninterrupted series of blunt, irregular denticles; (b) anterior clypeal margin with a median anteriorly protruding point. Further, workers have the pronotum either with dorsolateral, irregular, sharp borders or with anterolaterally directed dorsal teeth, which can also be interpreted as an autapomorphic trait.

Few taxonomists have treated this genus in the past and some subspecific forms (*L.bedoti* var. *lucidus* Menozzi, *L.quadrispinosus* var. *opaciceps* Viehmeyer and *L.quadrispinosus* subsp. *taivanae* Forel) are actually good species. Others (*L.quadrispinosus* var. *taprobanae* Forel and *L.quadrispinosus* var. *javana* Karavaiev) are treated as junior synonyms. The genus is divided in two equally-sized groups: the *quadrispinosus*-group (*birmanus*, *kali*, *opaciceps*, *quadrispinosus* and *taivanae*), whose species have two anterodorsal pronotal teeth, and the *bedoti*-group (*ambiguus*, *bedoti*, *longicornis*, *lucidus* and *striatulus*), where the pronotum is sharply and irregularly dorsolaterally marginated. Besides this major diagnostic character, *Lophomyrmex* seems rather constant in all the other features.

Some species (*ambiguus*, *longicornis*, *lucidus*, *opaciceps* and *taivanae*) seem to have a rather restricted distribution, but others (*bedoti*, *birmanus* and *quadrispinosus*) are widespread over large areas. *L.kali* and *L.striatulus* were collected in just one locality and their actual range can not be confidently established.

*Lophomyrmex* has been placed in Pheidologetonini since Emery (1922) and Wheeler (1922), but both authors felt this tribal placement was provisional. Nevertheless the taxonomic position of the genus has remained unchanged. In my opinion this treatment is very unsatisfactory

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and, as I will discuss later, *Lophomyrmex* is more properly placed in the tribe Pheidolini, close to *Pheidole*.

### Measurements and indices

TL, HW, HL, CI, SL, SI, PW and AL are standard measurements in ant taxonomy (see Bolton 1987, for definitions).

Two more measurements and one index, which are useful for defining some species, have been added:

Propodeal spine length (SpL): with the spine in full lateral view (slightly oblique to the body axis), it is the straight dorsal distance from the base of the spine to its apex. The base of the spine was arbitrarily considered as the midpoint of the concavity where propodeal dorsum and spine meet (Fig. 1).

Hind tibia length (HTL): the length of the hind tibia excluding its more proximal portion, i.e. the 'knee' which is concealed by the apex of the femur when the leg is fully straightened.

Tibial index (TI):  $(HTL/HW) \times 100$ .

All the measurements are in millimetres and were taken by means of a Wild M8 stereomicroscope with an ocular graticule.

### Depositories

ANIC: Australian National Insect Collection, C.S.I.R.O., Canberra, A.C.T., Australia.

BMNH: The Natural History Museum, London, U.K.

DZTAU: Department of Zoology, Tel Aviv University, Tel Aviv, Israel.

IEB: Istituto di Entomologia 'Guido Grandi', Bologna, Italy.

IZUAS: Institute of Zoology, Ukrainian Academy of Sciences, Kiev, Ukraine.

MCSNG: Museo Civico di Storia Naturale, Genoa, Italy.

MCZ: Museum of Comparative Zoology, Harvard University, Cambridge, Mass., U.S.A.

MNHG: Muséum d'Histoire Naturelle, Geneva, Switzerland.

MNHU: Museum für Naturkunde an der Humboldt Universität zu Berlin, Germany.

UCD: University of California, Davis, Calif., U.S.A.

### *Lophomyrmex* Emery (Figs 1–28)

*Lophomyrmex* Emery, 1892: 114. Type-species: *Oecodoma quadrispinosa* Jerdon, 1851: 111, by monotypy.

### Diagnosis

*Worker* (Figs 1–4, 9–28)

Monomorphic, terrestrial myrmicine ants, with the following combination of characters.

(1) Palp formula 2,2.

(2) Mandibles with the following dentition: masticatory margin with apical and one preapical tooth, followed by an enlarged denticle; these then followed by a continuous series of irregular small denticles, usually with a larger one at about the midlength of the row; basal margin always finely serrated, continuing the denticulation of the masticatory margin (Fig. 2).

(3) Clypeus vaulted in the middle, with a protruding blunt tooth at the midpoint of its anterior margin (Fig. 3). At each side of this tooth there is a strong seta, anteriorly directed and slightly curved downward. The clypeus is posteriorly broadly inserted between the frontal lobes (wider than a single lobe at this point).

(4) Frontal lobes weakly converging anteriorly; frontal carinae and antennal scrobes absent; frontal triangle rather well defined.

(5) Antenna 11-segmented with a distinct 3-segmented club, which is longer than the rest of the funiculus.

(6) Eyes at about the midlength of the head in full-face view; oval in profile, with a slight antero-ventral point.

(7) Pronotum domed in profile, with the dorsum quite flattened and the humerus bearing a single erect hair. In dorsal view the sides of the upper face may be either irregularly marginate or armed anteriorly with a horizontal flat tooth or spine formed by a lateral and an anterior edge. When present the teeth are outward and forward-directed.

(8) Promesonotal suture vestigial. Mesonotum in lateral view gradually sloping toward the propodeum, it bears around its midlength a prominence, sometimes very low.

(9) Metanotal groove well defined, slightly to deeply impressed in profile.

(10) Metapleural gland present.

(11) Propodeum bispinose, spines well developed and long.

(12) Propodeal spiracle in side view circular and located near the base of the spine.

(13) Propodeal lobes indistinct.

(14) Metasternal process present, low and rounded.

(15) Posterior portion of the metasternum closed, membranous ligament at the articulation of the petiole not visible (Fig. 4).

(16) Tibial spur of middle and hind legs present and simple, not clearly visible.

(17) Petiole with a distinct, fairly long, peduncle, and with a high node which is not triangular in shape in profile.

(18) Petiolar spiracle placed at the midlength of the peduncle.

(19) Postpetiole wider and usually slightly higher than the petiole; the tergite much more developed than the sternite.

(20) First gastral tergite large, but ventrally not extensively overlapping the sternite. Anterior corners of the gaster, at the sides of the postpetiolar insertion, obtuse, not protruding anteriorly.

(21) Sting reduced.

(22) Sculpture usually poorly developed, mostly reticulate; head, pronotum and gaster usually shining, at least in part. Mandibles striate at least on their basal half. Clypeus

finely shagreened or reticulate with posteriormost median portion smooth and shining. Colour varying from pale brownish yellow to medium brown.

(23) Long erect hairs present throughout the body excluding the dorsum of the propodeum. Pubescence and oblique tiny hairs sparse on the body; appendages with abundant, long, subdecumbent to oblique pubescence. Eyes covered with very small erect hairs, usually hooked at their tip.

*Female* (based on *quadrispinosus*, *bedoti*, *lucidus* and an unassociated specimen) (Figs 5–6).

Much larger, darker and more sculptured than the worker; mandibles, clypeus and antenna as in the worker. The other characters as follows:

(1) Palp formula 2,2.

(2) Head either trapezoidal (*quadrispinosus*, *bedoti*, *lucidus*), broader than long and anteriorly narrowed (Fig. 5), or approximately square in shape (unassociated female).

(3) Eyes at the midlength of the head in full-face view.

(4) Ocelli well developed, separated from one another by a distance more than their maximum diameter (*quadrispinosus*, *bedoti*, *lucidus*) or approximately equal to it (unassociated female).

(5) Alitrunk much longer than wide. Scutum covering the pronotum in dorsal view. Parapsidal furrows weak. Axillae well separated, but linked by a strip that may be either thin or quite broad. Metanotum visible from above. Propodeum bidentate or bispinose.

(6) Propodeal spiracle approximately elliptical or circular; in lateral view its opening is posteriorly directed and sometimes slightly ventrally directed. The spiracle is anteriorly placed: a little above the midheight of the propodeum and much nearer the anterior suture than the posterior propodeal surface.

(7) Petiole pedunculate with the node triangular and rounded in profile. A weak anterior subpetiolar prominence present.

(8) Postpetiole massive, wider than the petiole in dorsal view and broadly articulated to the gaster.

(9) Sculpture as follows:

Mandibles longitudinally striate. Clypeus smooth and shining at least posteriorly. Head dull, strongly reticulate, with some overlapping fine, approximately longitudinal, rugulation, especially on the genae and frons. Alitrunk mostly punctured and reticulate. Scutum approximately subopaque, less smooth than the scutellum. Mesopleuron mostly unsculptured and shining. Petiole and postpetiole microreticulate and opaque. Gaster generally shining, with tiny, dense punctures from which pubescence and pilosity rise.

(10) Body colour varying from light (*bedoti*, *lucidus* and unassociated specimen) to dark brown (*quadrispinosus*).

(11) Pubescence abundant and dense all over the body and the appendages, usually decumbent to subdecumbent. Erect hairs sparse on the dorsum of the body and on the ventral surface of the head. Eyes covered with dense hairs as in the worker.

(12) Forewings with one cubital cell and m-cu vein (Fig. 6); not hyaline: either uniformly infuscated (*quadrispinosus*, *bedoti*) or weakly yellowish throughout (*lucidus*).

*Male* (based on *quadrispinosus*, *bedoti* and *lucidus* (Figs 7–8).

(1) Palp formula 2,2.

(2) Head (including the eyes) wider than long (Fig. 7).

(3) Mandibles moderately developed, but not touching each other when fully closed; armed with a single apical tooth, which may be sometimes worn out (*quadrispinosus*, *bedoti*) or serrated on its masticatory and basal margin (*lucidus*) (Fig. 8). The angle between the margins is widely rounded.

(4) Clypeus vaulted in the middle, very poorly angled at the midpoint of the anterior border.

(5) Frontal lobes absent. Antennal sockets visible in dorsal view.

(6) Frontal triangle large, heavily sculptured and opaque, not well defined, sometimes distinctly transversally rugose (*quadrispinosus*).

(7) Antenna 13-segmented without a club. Scape short and thick, shorter than any funicular segment excluding the first (*quadrispinosus*) or about as long as these (*bedoti* and *lucidus*). First funicular segment approximately half as long as the scape, but not swollen. Other funicular segments very elongated and of similar length.

(8) Eyes at the midlength of the head sides in full-face view, well separated from the mandibular insertion and from the occipital head surface.

(9) Ocelli not surmounting a turret and separated from one another by much more than their diameter.

(10) Alitrunk elongated. Scutum well above the pronotum, without notauli and with weak but distinct parapsidal furrows. Axillae small and well separated, linked by a very narrow strip (*quadrispinosus*) or a quite wide one (*bedoti* and *lucidus*). Metanotum visible from above. Propodeum bidentate or weakly bituberculate.

(11) Propodeal spiracle as in the female.

(12) Petiole pedunculate. Its node broadly triangular with a rounded top in profile, sometimes very low (*bedoti* and *lucidus*).

(13) Postpetiole in dorsal view much wider than the petiole, thick and broadly attached to the gaster. The tergite much more developed than the sternite.

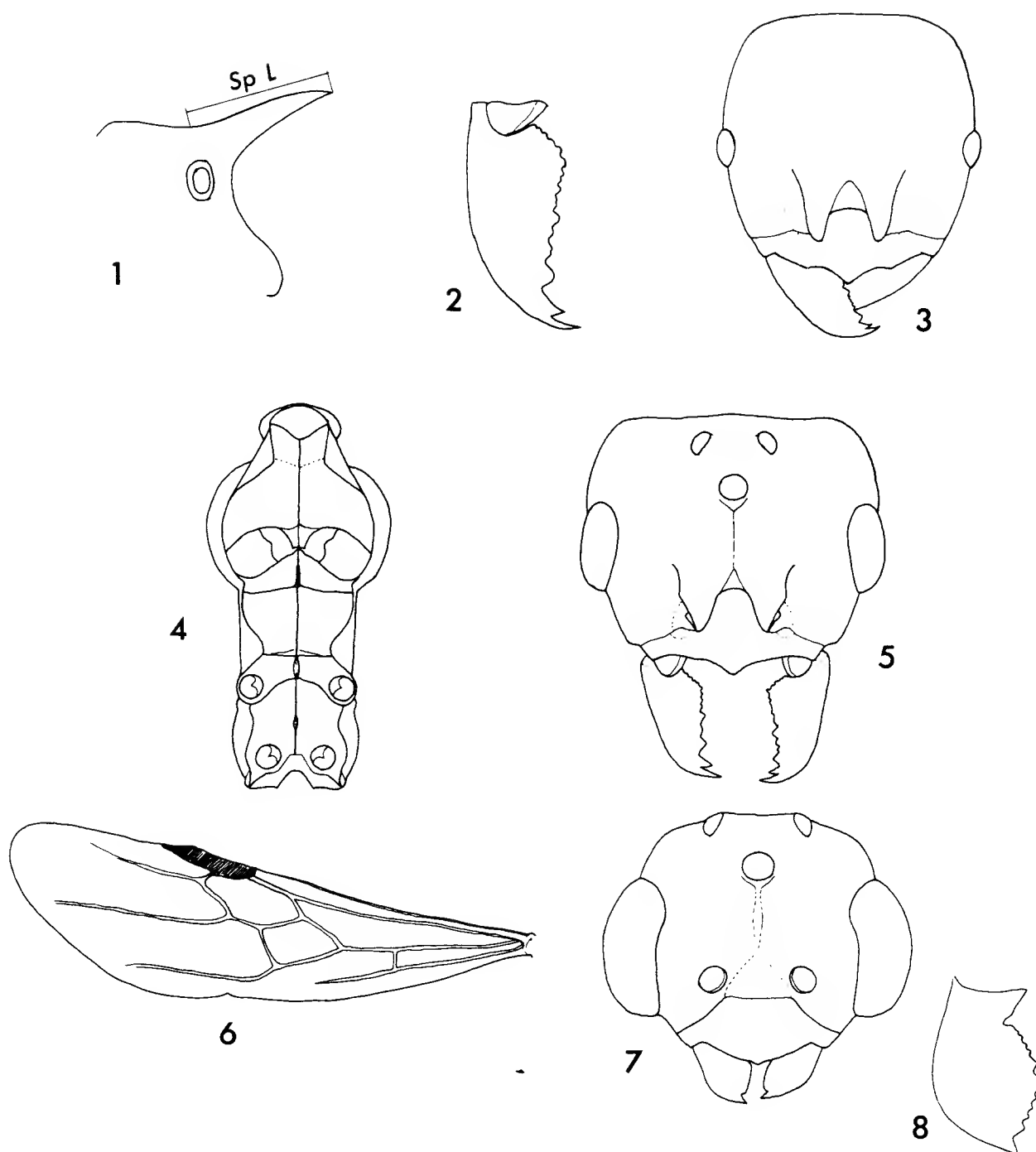
(14) Sculpture as follows:

Head well sculptured and opaque, only the centre of the clypeus smooth and shining. Alitrunk not as sculptured as the head, only the propodeum fully opaque. Middle of the scutum slightly shining, scutellum fairly smooth in the middle. Petiole and postpetiole dull, mostly reticulate. Gaster smooth.

(15) Colour from brownish yellow (*bedoti* and *lucidus*) to dark brown.

(16) Pubescence long and rich throughout the body. Pilosity as in the female. Eyes covered with dense, very short erect hairs.

(17) Wings as in the female.



**Figs 1–8.** 1: Spine length measurement (see text); 2: mandible of *quadrispinosus* worker; 3: head of *quadrispinosus* worker; 4: ventral surface of the alitrunk of *bedoti* worker; dotted area represents the posterior portion of the metasternum (see text); 5: head of *bedoti* female; 6: wing of *bedoti* female; 7: head of *quadrispinosus* male; 8: mandible of *lucidus* male. (Pilosity and sculpture omitted).

#### Taxonomic position

Emery (1922) and Wheeler (1922) thought that *Lophomyrmex* was related to *Pheidologeton*. The main reasons they gave for the placement of *Lophomyrmex* in Pheidologetonini were the 11-segmented antenna and the presence

of a single cubital cell in the forewing. Yet Emery recognized *Lophomyrmex* as a quite distinct genus among Pheidologetonini. He placed it in a subtribe Lophomyrmecini, along with *Recurvidris* (originally *Trigonogaster*, see Bolton, 1992), because of its 3-segmented antennal club, in contrast with the other Pheidologetonini which

have a 2-segmented club. Both Emery and Wheeler considered this arrangement quite artificial, but in their following papers neither author tried to change the tribal position of *Lophomyrmex*.

Later, Wheeler & Wheeler (1954) studied the larvae of the genera included in Pheidologetonini but they failed to gain any evidence of strong affinities between the larvae of *Lophomyrmex* and *Pheidologeton*.

Ettershank (1966) was the last author who gave a full diagnosis of the *Pheidologeton* genus group. He defined this using a series of characters that were rather inconsistent among the genera: clypeus variable in shape and weakly or not bicarinate; number of antennal segments 8–12 (with 2–3 segmented club); palp formula from 3,2 to 1,2; workers polymorphic, dimorphic or even monomorphic. He did not furnish any reliable synapomorphies for a better definition of the whole group.

More recent comparisons among pheidologetonine genera were those of Kugler (1986), based on the structure of the sting, and Moffett (1986) based on foraging behaviour. Kugler (1986) found only some widespread superficial resemblances in the sting structure between *Pheidologeton* and *Lophomyrmex*, due to the reduction of the apparatus; moreover *Lophomyrmex* shares some peculiar features with apparently unrelated genera, above all *Recurvidris*. Moffett (1986) discovered some weak similarities between *Pheidologeton* and *Lophomyrmex* in foraging behaviour, but these can easily be interpreted as convergence.

Although former authors recognized the weakness of the arguments about the placement of *Lophomyrmex* within Pheidologetonini, no one tried seriously to correct its taxonomic position. The tribe Pheidologetonini, as currently interpreted, contains a mixture of only superficially related genera. In particular *Lophomyrmex* seems a good candidate for being removed from the tribe.

At the beginning of his generic diagnosis of *Lophomyrmex* Emery (1922) stated: 'appearance of a *Pheidole* worker'. In fact, I think that the correct placement of *Lophomyrmex* is near *Pheidole* and quite far from *Pheidologeton*.

These three genera share some derived features, which are widespread among Myrmicinae and can also be interpreted as convergent traits (numbers are those reported under the worker diagnosis): (1) palp formula 2,2, it is constant in *Pheidologeton* and *Lophomyrmex*, and it occurs also in some *Pheidole* groups (Bolton, pers. comm.); (5) antenna 11-segmented, constantly in *Lophomyrmex* and *Pheidologeton*, rarely in *Pheidole*; (12) propodeal spiracles near the base of the propodeal spine in profile (this condition may be thought of as an apomorphy when compared with the primitively more anteriorly placed propodeal spiracle of the Ponerinae; Bolton, pers. comm.); (21) sting reduced. Further, there is another character common to these three genera, but which at present can not be defined either as primitive or as derived: (15) in ventral view posterior metasternal portion closed, obscuring the membranous ligament between alitrunk and petiole (Fig. 4).

I found just two weak characters linking *Lophomyrmex* to *Pheidologeton* and separating them from *Pheidole*: (18)

petiolar spiracle about at the midlength of the peduncle, as in many unrelated Myrmicinae (very anteriorly placed in *Pheidole*, near the base of the peduncle, where it might represent a plesiomorphic state); forewing with a single cubital cell (Fig. 6) (two cubital cells in *Pheidole*). The latter character is very feeble because the presence of a single cubital cell occurs in many unrelated Myrmicinae; also, Bolton (1982) stated it is present among Pheidolini and both conditions (one or two cubital cells), linked by intermediate ones, may occur in the same genus.

*Lophomyrmex* shares with *Pheidole*, but not with *Pheidologeton*, a series of features, mostly of difficult interpretation: (4) frontal triangle well defined (poorly so in *Pheidologeton*); (5) antenna with a 3-segmented antennal club (2-segmented in Pheidologetonini); (23) pubescence on the appendages long, abundant and more or less oblique, although some *Pheidole* have a different condition (in *Pheidologeton* the pubescence on the appendages is sparse or very reduced and accompanied by at least a few long, standing hairs). Moreover *Lophomyrmex* has a peculiar, autapomorphic mandibular dentition (Fig. 2), which is somewhat comparable with the multidentate condition of *Pheidole*, but not at all with the reduced number of teeth of Pheidologetonini (4–6 teeth, without serration), which represents a fully divergent apomorphic trait. Other features of little value recall a *Pheidole* minor worker: head shape and eye size (eyes are mostly secondarily reduced in Pheidologetonini).

Yet, besides these feeble similarities, there is a strong synapomorphy showing the close relation of *Lophomyrmex* with *Pheidole* (see points 7 and 8 under worker diagnosis): pronotum domed and marked posteriorly by a vestigial promesonotal suture, and mesonotum gradually sloping downward and bearing a prominence near its midlength in profile. The domed pronotum with at least a trace of the promesonotal suture is the major synapomorphic trait defining *Pheidole* and its allies and separating them from the other Myrmicinae (Bolton, pers. comm.).

Moreover, *Lophomyrmex* and *Pheidole* have armed or somewhat marked pronotal sides near the humeri (unarmed, unmargined and without any prominence in *Pheidologeton* and related taxa); but this is perhaps a convergent trait, for their shape is rather different, although it could be derived from unpeculiar small protuberances as it occurs in most *Pheidole* species.

Thus, *Lophomyrmex* is a distinct and easily recognizable genus belonging to the Pheidolini (**tribal transfer**), with autapomorphic clypeus, mandibular dentition and dorso-lateral pronotal sides. Probably, its past placement within the Pheidologetonini was due to the widespread use of placing some more or less peculiar genera in large 'parking tribes', hoping that someone, sooner or later, could better explain their affinities.

## Key to workers

- 1 In dorsal view the pronotum with lateral irregular marginations only (*bedoti* group) ..... 2

- In dorsal view the anterior pronotum with two distinct flattened teeth or spines, horizontal and anterolaterally directed (*quadrispinosus* group) (Figs 19, 21, 23, 25, 28) ..... 6
- 2 SI  $\geq 100$ , SpL  $\geq 0.34$ . Pronotum in frontal view without a pair of anterior erect setae near the midline (Fig. 12); mesonotum in profile at most with some thin, short, oblique hairs (Fig. 11). (Brunei, E. Malaysia) ..... *longicornis*
- SI < 100, SpL < 0.34. Pronotum in frontal view with a pair of anterior erect setae near the midline (Fig. 10); mesonotum in profile with standing stiff hairs (Figs 9, 13, 14, 16) ..... 3
- 3 Smooth and shining; only the upper portion of the mesopleuron clearly reticulate. TL < 2.8. (W. Malaysia) ..... *lucidus*
- At least whole mesothorax and propodeum with distinct reticulation. TL often > 3 ..... 4
- 4 Sculpture less developed: pronotal sides and head surface behind and below the eyes shining, at most faintly sculptured. Eyes smaller: in lateral view the distance between their anterior margin and the mandibular insertion is  $\geq 1.5$  times the maximum eye length. Propodeal spines in lateral view thinner, appearing longer and very straight (Fig. 9). Petiolar node clearly obliquely truncate: the steep anterior face and the flat dorsum meet at a distinct, sometimes slightly protruding, angle (Fig. 9). (Sri Lanka, India, Burma, Malaysia, Singapore, Brunei, Indonesia, Philippines) ..... *bedoti*
- Sculpture more developed: pronotal sides and/or head surface behind and below the eyes always at least superficially sculptured, not fully shining. Eyes larger: in lateral view the distance between their anterior point and the mandibular insertion is usually less than 1.5 times the maximum eye length. Propodeal spines in lateral view more gradually narrowing towards their tips and appearing shorter and not very straight (Figs 14, 16). Petiolar node somewhat rounded (Figs 14, 16) ..... 5
- 5 In lateral view the pronotum costulate with at least one longitudinal anterior, short costula running backward from the insertion of the humeral seta (Fig. 17). In full-face view head usually more clearly rugulose in the space contained between the inner margin of the eyes and the frontal lobes. (The rugulae are more easily visible in oblique view) (Thailand) ..... *striatulus*
- In lateral view the pronotum is not longitudinally costulate: no costulae running backward from the insertion of the humeral seta (Fig. 15). Head usually devoid of rugulae in the space contained between the inner margin of the eyes and the frontal lobes. (India, Nepal) ..... *ambiguus*
- 6 Pronotum with teeth that only slightly protrude (Figs 19, 21). In dorsal view their anterior margins are approximately at a right-angle to the body axis or even faintly convergent anteriorly; their outer edges are straight or very weakly concave: the teeth do not look suddenly narrowed near their apices ..... 7
- Pronotum with spiniform teeth that distinctly protrude (Figs 23, 25, 28). In dorsal view their anterior margins are moderately to markedly divergent anteriorly; if moderately, then their outer edges are often clearly concave and the teeth have a narrower apex (Fig. 23) ..... 8
- 7 SI < 84, HL often > 0.80. Pronotal teeth more or less sharp in dorsal view (Fig. 19). Mesonotum, propodeum, petiole and postpetiole distinctly reticulate. Propodeal spines slightly down-curved (Fig. 18). Postpetiole shorter than the petiole in lateral view (Fig. 18). (Sri Lanka, India, Burma) ..... *quadrispinosus*
- SI > 84, HL < 0.80. Pronotal teeth blunt in dorsal view (Fig. 21). Mesonotum, propodeum, petiole and postpetiole faintly sculptured. Propodeal spines straight (Fig. 20). Postpetiole massive, approximately as long as the petiole in lateral view (Fig. 20). (Taiwan) ..... *taivanae*
- 8 SI and TI = 100. Propodeal spines slightly upcurved in profile (Fig. 26). (India) ..... *kali*
- SI and TI < 100. Propodeal spines straight or feebly down-curved in profile ..... 9
- 9 Pronotal spines strongly diverging anteriorly and with longer, sharper tips (Fig. 25). More sculptured species: at least mesothorax, propodeum, petiole and postpetiole clearly reticulate; often dorsum of head and pronotum longitudinally rugulose. Postpetiole distinctly shorter than the petiole (Fig. 24). (Java) ..... *opaciceps*
- Pronotal spines neither so divergent nor with such long and sharp tips (Fig. 23). Less sculptured: mesonotum and nodes of petiole and postpetiole not wholly and clearly reticulate; head always shining. Postpetiole nearly as long as the petiole (Fig. 22). (Sri Lanka, Burma, Thailand) ..... *birmanus*

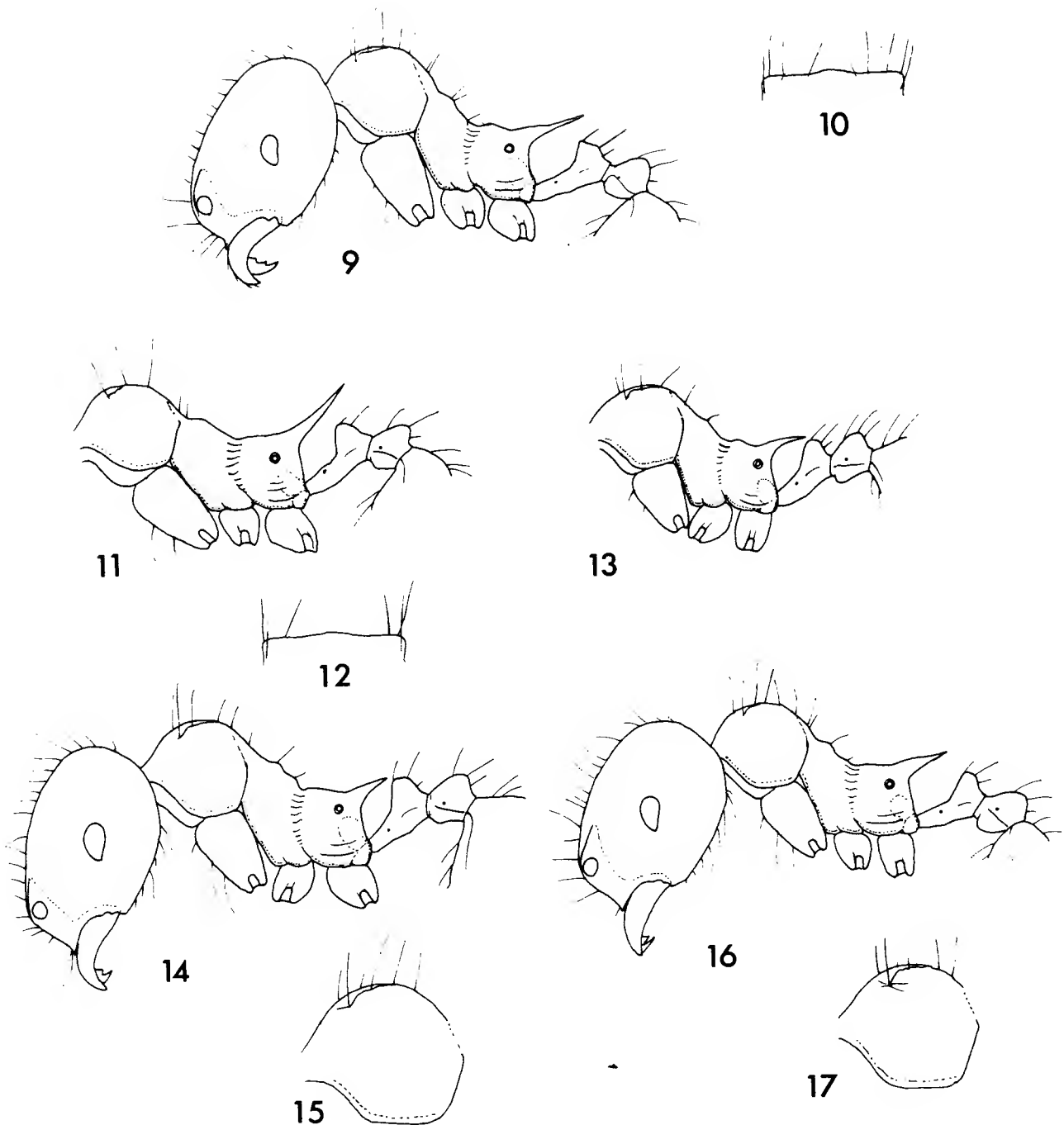
#### *L. bedoti* group

#### *Lophomyrmex ambiguus* sp.n. (Figs 14, 15)

Holotype worker: TL 3.1, HL 0.80, HW, 0.75, CI 94, SL 0.68, SI 91, PW 0.49, AL 0.95, SpL 0.23, HTL 0.69, TI 92.

In lateral view the distance between the mandibular insertion and the anterior point of the eye is about 1.3 times the maximum eye length. Mesonotum in profile with feeble prominence and posterior step; both, as usual, marked by a couple of erect hairs. Metanotal groove distinct in profile. Propodeal spines in profile straight, not very long and with a quite wide base from which they gradually taper toward the tips. Petiolar node in profile high and briefly subtruncate. Its anterior and superior faces meet at a rounded angle; posteriorly there is an evenly rounded, well-defined, step. Postpetiole not massive, clearly shorter than the petiole and about as high as that. In dorsal view the postpetiole is about 1.6 times wider than the petiole.

Clypeus finely reticulate, sublucid except for its posteriormost median portion which is smooth. Frontal triangle mostly shagreened, only partially shining. Cephalic dorsum finely reticulate throughout and quite dull, chiefly on the portions contained between the level of the inner margin of the eyes and the frontal lobes; frons sublucid in the middle. Genae and frontal lobes with tiny longitudinal rugulae; those on the frontal lobes look long and fragmented and reach the vertex (they are more visible in oblique view). Ventral head surface with some anteriorly convergent faint rugulae. Anterior slope of the pronotum reticulate and sublucid. Pronotal dorsum between the lateral margins quite shining and irregularly sculptured, feebly reticulate with few short faint rugulae anteriorly; a blunt poorly defined longitudinal median carina also



**Figs 9–17.** *bedoti* group. 9–10: body profile (9) and frontal view of the pronotum (10) of *bedoti*; 11–12: alitrunk profile (11) and frontal view of the pronotum (12) of *longicornis*; 13: alitrunk profile of *lucidus*; 14–15: body profile (14) and close lateral view of the pronotum (15) (see text) of *ambiguus*; 16–17: body profile (16) and close lateral view of the pronotum (17) (see text) of *striatulus*. (Minute pilosity and sculpture omitted; in 15 and 17 the sculpture around the humeral hair insertion is shown).

occurs. Pronotal sides shining, with very superficial longitudinally oriented reticulation. Mesonotum reticulate, sublucid; mesopleuron more strongly reticulate, dull. Propodeum reticulate, subopaque, excluding the smooth space between the spines and the declivity. Petiole and postpetiole clearly reticulate on the sides; the nodes only

faintly reticulate and moderately shining. Gaster shining, very superficially reticulate; the reticulation is not continuous on the whole surface.

Pilosity as usual in the genus. Pubescence very sparse, subdecumbent on the alitrunk, more abundant on the head.

Colour chiefly light brown throughout; appendages slightly lighter.

Additional workers: TL 2.8–3.4, HL 0.70–0.85, HW 0.64–0.81, CI 91–96, SL 0.59–0.71, SI 86–92, PW 0.44–0.54, AL 0.84–1.03, SpL 0.20–0.28, HTL 0.61–0.75, TI 89–96 (7 paratypes and 6 non-paratypes measured).

As the holotype but varying as follows:

Eye distance from the mandibular insertion often 1.4 times the maximum eye length. Propodeal spines may be slightly bent downward in profile. Sometimes the sculpture is less developed, chiefly in smallest specimens; the head is a little more superficially reticulate and its ventral surface may be shining and without any recognizable faint rugulae. The pronotum may be devoid of short rugulae.

Colour often lighter on the sides of head and alitrunk.

Holotype worker, INDIA: Uttar Pradesh, Kuamun District, Kathgodam, 600 m, 6.x.1979, sifted leaf litter (*I. Löbl*) (ANIC).

Paratype workers, 2 specimens with the same data as the holotype (BMNH: ANIC); 2 specimens, INDIA: Uttar Pradesh, Dehra Dun, 30.viii.1978 (*H. Imai*) ('Indian ants cytology', voucher specimens n°.78–60) (ANIC) [misidentified as *L. bedoti*]; 3 specimens, INDIA: NE India, without locality and date (*Kurl*) (BMNH; MCZ).

Non-paratypic workers, NEPAL: 16 km ENE Baglung, 1100 m (*P. S. Ward*) [with abraded dorsal pilosity] (BMNH; UCD).

*Comments.* *L. ambiguus* may be confused with *L. striatulus* (see there) and *L. bedoti*, but it is more distinctly sculptured than the latter. Moreover *L. bedoti* has slightly smaller eyes, which are about 1.5 times their maximum length from the mandibular insertion in lateral view. The propodeal spines of *L. ambiguus* look shorter and thicker in profile. The petiolar node of *L. ambiguus* (Fig. 14) is not so clearly obliquely truncate as in *L. bedoti* (Fig. 9). Also *L. ambiguus* is usually darker and with a deeper metanotal groove.

#### ***Lophomyrmex bedoti* Emery (Figs 4–6, 9–10)**

*Lophomyrmex bedoti* Emery, 1893: 192. Syntype workers and females, INDONESIA: Sumatra, Deli (*Bedot*) (MCSNG) [workers examined].

Worker: TL 2.5–3.5, HL 0.66–0.89, HW 0.60–0.87, CI 88–99, SL 0.58–0.75, SI 85–98, PW 0.38–0.58, AL 0.75–1.09, SpL 0.21–0.33, HTL 0.55–0.75, TI 83–95 (162 measured).

With the characters given in the key and the following: Mesonotum in profile with a very low, barely evident prominence. Metanotal groove in profile very shallow without clear anterior and posterior borders. Propodeal spines in profile usually very straight, quite thin and with a

sharp tip. Some specimens may have more proximally enlarged spines not so thin as usual. Petiole in profile with a rather narrow peduncle and a distinct high node. This has a steep anterior face meeting the superior one at a distinct angle; posteriorly the node often has an evident rounded step toward the postpetiole.

Clypeus finely sculptured, sublucid except for its posteriormost median portion which is smooth. Frontal triangle sublucid. Cephalic dorsum superficially reticulate, rather shining on the frons and vertex, but, mostly in largest specimens, sublucid on the lateral portions contained between the level of the inner margin of the eyes and the frontal lobes. Genae and frontal lobes longitudinally rugulose. Anterior slope of the pronotum clearly reticulate and sublucid. Pronotal dorsum between the lateral margins and pronotal sides shining, very superficially sculptured, chiefly reticulate; a very faint longitudinal median carina also occurs on the pronotal dorsum. Mesonotum superficially reticulate, more shining on its anterior half. Mesopleurae and propodeum, excluding the declivity, finely reticulate and more or less opaque. Petiole and postpetiole reticulate on the sides, usually sublucid; top of petiolar node faintly reticulate; dorsum of postpetiole quite smooth anteriorly. Gaster mostly glassy smooth, shining.

Colour usually brownish yellow, darker on the dorsum, to light brown.

Female: TL about 9.5–10. Ocelli quite wide, but separate from one another by a distance much larger than their maximum diameter. Axillae distinctly separate but linked by a narrow strip. Propodeal teeth short and strong or spiniform and blunt. Propodeal spiracle directed a little backward.

Clypeus punctured and sublucid. Head distinctly reticulate and opaque with superimposed longitudinal rugulae more evident on the anterior half. Scutum opaque, reticulate. Scutellum clearly shining and poorly sculptured in the middle. Gaster finely punctured, sublucid.

Colour mostly brown, reddish brown on the sides, legs lighter. Wings uniformly infuscated.

Male [previously undescribed]: TL about 5.6–6. Mandibles not serrated. Propodeum bituberculate, tubercles widely rounded. Petiole in profile with a very low, rounded node. Postpetiole a little higher than the petiole.

Mandibles finely striate. Clypeus feebly sculptured and sublucid. Head finely reticulate, opaque. Alitrunk sculptured about as in the female; but scutellum less shining and with some longitudinal sculpture pattern. Gaster finely punctured and quite lucid.

Colour mostly brownish yellow, brown on the posterior half of the head and scutellum, scutum and dorsum of the gaster with an intermediate tinge. Wing slightly lighter than in the female.

*Comments.* A widespread species which sometimes may be confused with *L. ambiguus* (see there). The original locality was reported as Sumatra: Deli; yet Deli is a small



island near the southern coast of the westernmost point of Java.

**Material examined.** SRI LANKA: Peradeniya (C. T. Bingham). INDIA: Sikkim, Tukvar (C. T. Bingham). BURMA: Maymyo, 3000 ft (C. T. Bingham). W. MALAYSIA: Gn. Gerai (G. H. Lowe); Kedah, Gunung Jerai (R. W. Taylor and R. A. Barrett); Georgetown (R. W. Taylor and R. A. Barrett); Selangor Gombak (D. H. Murphy); Johore Jasons Bay (D. H. Murphy); 10 mi E Tapah (D. H. Murphy); Selangor (C. Betts); Selangor, Ulu Gombak For. Res. (R. Crozier); Selangor, Kepong Waterworks Res. (R. Crozier); G. Lawit (T. Clay); Penang (M. W. Moffett and D. R. Fletcher); Bukit Rengit nr Lanchang (H. Imai and Kubota); Bukit Fraser, Jerian W. Fall (H. Imai and Kubota); Pasoh Forest (Watanabe); Negeri Sembilan, Pasoh For. Res. (K. Rosciszewski). E. MALAYSIA: Sabah, Sepilok For. Res. nr Sandakan (R. W. Taylor); Sabah, Gn. Silam, 810 m (R. Leakey); Sabah, Tuaran; Sabah, Poring Hot Springs, 500 m (I. Löbl and D. Burckhardt); Sarawak, Mulu Nat. Park (M. Collins; P. M. Hammond and J. E. Marshall); Sarawak, no locality, 99–294 (Dr Haviland); Sarawak, Semengoh For. Res., 11 mi SW Kuching (R. W. Taylor); Sarawak, Mt Santubong nr Kuching (R. W. Taylor); Sarawak, Mi 43 Labuk Rd ex Sandakan (R. W. Taylor); Sarawak, 1°38'N–113°36'E, 600 ft (A. Emerson). SINGAPORE: Bukit Timah (M. W. Moffett and D. R. Fletcher); Mandai (D. H. Murphy). BRUNEI: Kuala Belalong Res., Temburong (R. Levy). INDONESIA: Kalimantan, Pleihari Martapura Res. (M. W. Moffett and D. R. Fletcher); Kalimantan, timber camp via Balikpapan (N. Johnson); Sumatra, Lho 'Nga Cantab [= Lhoknga?] (I. Davis); Sumatra, Panti, 250 m (D. Agosti, I. Löbl and D. Burckhardt); Sumatra, nr Payakumbuh, 600 m (D. Agosti, I. Löbl and D. Burckhardt); Java [see 'Comments' above], Deli (*Bedot*). PHILIPPINES: Palawan, 14 km S Puerto Princesa (B. B. Lowery).

***Lophomyrmex longicornis* sp.n.** (Figs 11, 12)

Holotype worker: TL 3.1, HL 0.80, HW 0.75, CI 94, SL 0.77, SI 103, PW 0.49, AL 0.98, SpL 0.39, HTL 0.74, TI 99.

Mesonotum in profile with a faint prominence and without a posterior step. Metanotal groove very shallow in profile. Propodeal spines in profile very long, straight and acute, reaching the level of the petiole–postpetiole articulation; they are also strongly divergent in dorsal view. Petiolar node in profile quite domed, with a moderately distinct angle between its anterior and dorsal faces. Postpetiole not massive, clearly shorter than the petiole.

Clypeus weakly reticulate, sublucid except for its posteriormost median portion which is smooth and shining. Frontal triangle irregularly sculptured and sublucid. Head shining, chiefly on the frons and vertex, very superficially reticulate. Genae with tiny longitudinal rugulae. Frontal lobes with faint longitudinal rugulae only. Anterior pro-

notal slope distinctly reticulate and sublucid. Pronotal dorsum between the lateral margins nearly glassy smooth, with only a trace of a median longitudinal carina. Pronotal sides shining, very weakly reticulate. Mesonotum, mesopleuron and propodeum, excluding its shining declivity, reticulate and somewhat subopaque or sublucid. Petiole and postpetiole with weak reticulation and sublucid, chiefly on the nodes. Gaster shining with only very superficial reticulation.

Pilosity as usual on the head, but reduced on the alitrunk. In frontal view the pronotum lacks any erect setae arising at the border with the anterior slope near the midline. In profile mesonotum with only tiny hairs or oblique pubescence marking the prominence and the posterior step.

Colour brownish yellow, head slightly darker.

Paratype workers: TL 3–3.5, HL 0.75–0.86, HW, 0.68–0.81, CI 91–99, SL 0.74–0.84, SI 100–110, PW 0.46–0.55, AL 0.91–1.07, SpL 0.34–0.42, HTL 0.69–0.80, TI 92–103 (32 measured).

As the holotype but varying as follows:

A faint posterior mesonotal step is often visible in profile. Propodeal spines not always strongly divergent in dorsal view and in profile they may be slightly curved upward, or even downward. A more evident median longitudinal carina may be present on the pronotal dorsum.

Colour varying from brownish yellow to light brown.

**Comments.** *L. longicornis* is a very distinct species. The more constant diagnostic characters are the high SI, the very long propodeal spines (whose length is approached only by some *bedoti* specimens) (Fig. 11); the shape of the petiolar node in profile and, above all, the reduced pilosity on the alitrunk (Figs 11, 12). The latter feature is unique if compared with all the other species in the genus (see Figs 9, 10 for comparisons).

Holotype worker, EAST MALAYSIA: Sarawak, 4th Div. G. Mulu Nat. Park, RGS Expn. Long Pala, lowland rainforest leaf litter, 6.x.1977 (B. Bolton) (BMNH).

Paratype workers, 19 specimens with the same data as the holotype; 6 specimens, E. MALAYSIA: Sarawak, 4th Div. Sawai For. Res., 4.iii.1978, rainforest soil core (N. M. Collins); 3 specimens, E. MALAYSIA: Sabah, Tawau, 13.xii.1981 (J. Waage); 2 specimens, Sabah, Gn. Silam 250 m 1983 (R. Leakey); 3 specimens, BRUNEI: Bukit Sulang nr Lamunin, BM 1982–388, 20.viii/10.ix.1982 T9/7, fogging (N. E. Stork) (BMNH; MCZ; ANIC; UCD).

Non-paratypic material: 2 damaged specimens with the same data as the holotype; 1 worker, E. MALAYSIA: Sarawak, Bongo Mt. (J. Hewitt).

***Lophomyrmex lucidus* Menozzi stat.n.** (Figs 8, 13)

*Lophomyrmex bedoti* var. *lucidus* Menozzi, 1930: 328.

Syntype workers, W. MALAYSIA: Penang, Georgetown (H. Eidmann) (IEB) [examined].

Worker: TL 2.5–2.7, HL 0.65–0.70, HW 0.61–0.65, CI 92–97, SL 0.54–0.59, SI 86–90, PW 0.39–0.44, AL 0.75–0.82, SpL 0.23–0.26, HTL 0.53–0.58, TI 84–89 (10 measured).

With the characters given in the key and the following: Mesonotum in profile with a feeble or faint prominence. Metanotal groove shallow in profile. Propodeal spines in profile straight or slightly curved downward, quite thin and very sharp. Petiolar node in profile high and usually subtruncate.

Clypeus somewhat shagreened and subopaque or sublucid, except for its posteriormost median portion which is smooth. Frontal triangle shining. Head shining, with only a very superficial, quite indistinct, reticulation. Genae with some short rugae. Frontal lobes finely longitudinally irregularly rugulose. Whole dorsum of the alitrunk shining, at most very superficially reticulate. Sides of the alitrunk with few sculptured areas: anterior upper part of mesopleuron and metanotal groove; the rest is smooth with at most a wide-meshed faint reticulation. Petiole and postpetiole chiefly shining and superficially reticulate mostly on the sides. Gaster glassy smooth, shining.

Colour very light brown, head with a reddish tinge.

Female [previously undescribed]: TL about 8.5. Propodeal spines stout, straight and quite sharp in lateral view. Clypeus shagreened and subopaque, except for its posteriormost median portion which is smooth. Frontal triangle quite shining. Head finely reticulate, opaque, rugulose chiefly in its anterior half. Scutum and scutellum finely punctulate-reticulate, subopaque. Axillae more densely sculptured, opaque, linked by a narrow strip. Gaster rather lucid.

Colour brown, with a somewhat reddish tinge chiefly on the gaster and on the sides of the alitrunk. Wing nearly hyaline, very feebly yellowish throughout.

Male [previously undescribed]: TL about 5.5. Mandibles with one apical and one preapical tooth, followed by a fine serration on both masticatory and basal margins. Petiole robust in profile, with a low and evenly rounded node.

Clypeus shagreened and sublucid. Head finely reticulate and opaque; some evident oblique rugulae occur at the posterior corners. Scutum finely punctulate-reticulate, sublucid. Scutellum less sculptured and more shining in the middle. Axillae dull, densely reticulate. Sides of the alitrunk more shining. Propodeum about as well sculptured as the scutum and with distinct blunt teeth. Petiole and postpetiole somewhat sublucid. Gaster rather shining.

Colour: head dark brown, alitrunk slightly lighter, petiole, postpetiole and gaster light yellowish brown. Wings as in female.

*Material examined.* W. MALAYSIA: Penang, Georgetown (H. Eidmann); Kelantan, Temangah (D. H. Murphy); Sungei Petani (G. H. Lowe).

*Lophomyrmex striatulus* sp.n. (Figs 16, 17)

Holotype worker: TL 2.8, HL 0.73, HW 0.69, CI 95, SL 0.61, SI 88, PW 0.45, AL 0.83, SpL 0.24, HTL 0.60, TI, 87.

In lateral view the distance between the mandibular insertion and the anterior point of the eye is about 1.3 times the maximum eye length. Mesonotum in profile with a low prominence and a faint posterior step. Metanotal groove very shallow in profile. Propodeal spines in profile rather straight and sharp; their superior border weakly convex in the basal half. Petiolar node in profile very briefly subtruncate and with a rounded angle between its anterior and dorsal faces; posterior slope distinct. Postpetiole not massive and shorter than the petiole.

Clypeus feebly shagreened and sublucid, except for its posteriormost median portion which is smooth. Frontal triangle weakly sculptured and sublucid. Head distinctly reticulate throughout, subopaque; frons and vertex more superficially sculptured and sublucid. Genae and frontal lobes with weak longitudinal rugulae. Ventral head surface with anteriorly convergent rugulae. Anterior pronotal slope clearly reticulate, with some short transverse rugulae on the sides. Pronotal dorsum with a weak longitudinal median carina and some irregular short rugae on the rest of the surface (more visible in oblique view). Pronotal sides faintly longitudinally striolate. Two weak short rugulae rise backward from the insertion of the humeral hair. Mesonotum, mesopleuron and propodeum, excluding its smooth declivity, clearly reticulate and quite dull; mesonotum slightly more superficially sculptured. Petiole and postpetiole wholly reticulate and mostly subopaque. Gaster very faintly reticulate and shining.

Pilosity and pubescence as usual in the genus.

Colour light yellowish brown, the whole dorsum slightly darker.

Paratype workers: TL 2.6–3.1, HL 0.65–0.77, HW 0.59–0.73, CI 91–96, SL 0.55–0.62, SI 85–93, PW 0.40–0.48, AL 0.75–0.89, SpL 0.22–0.26, HTL 0.54–0.63, TI 84–92 (29 measured).

As the holotype but varying as follows: Eye distance from the mandibular insertion ranges from about 1.2 to 1.3 times the maximum eye length. Propodeal spines, mesonotum and alitrunk rather constant in shape.

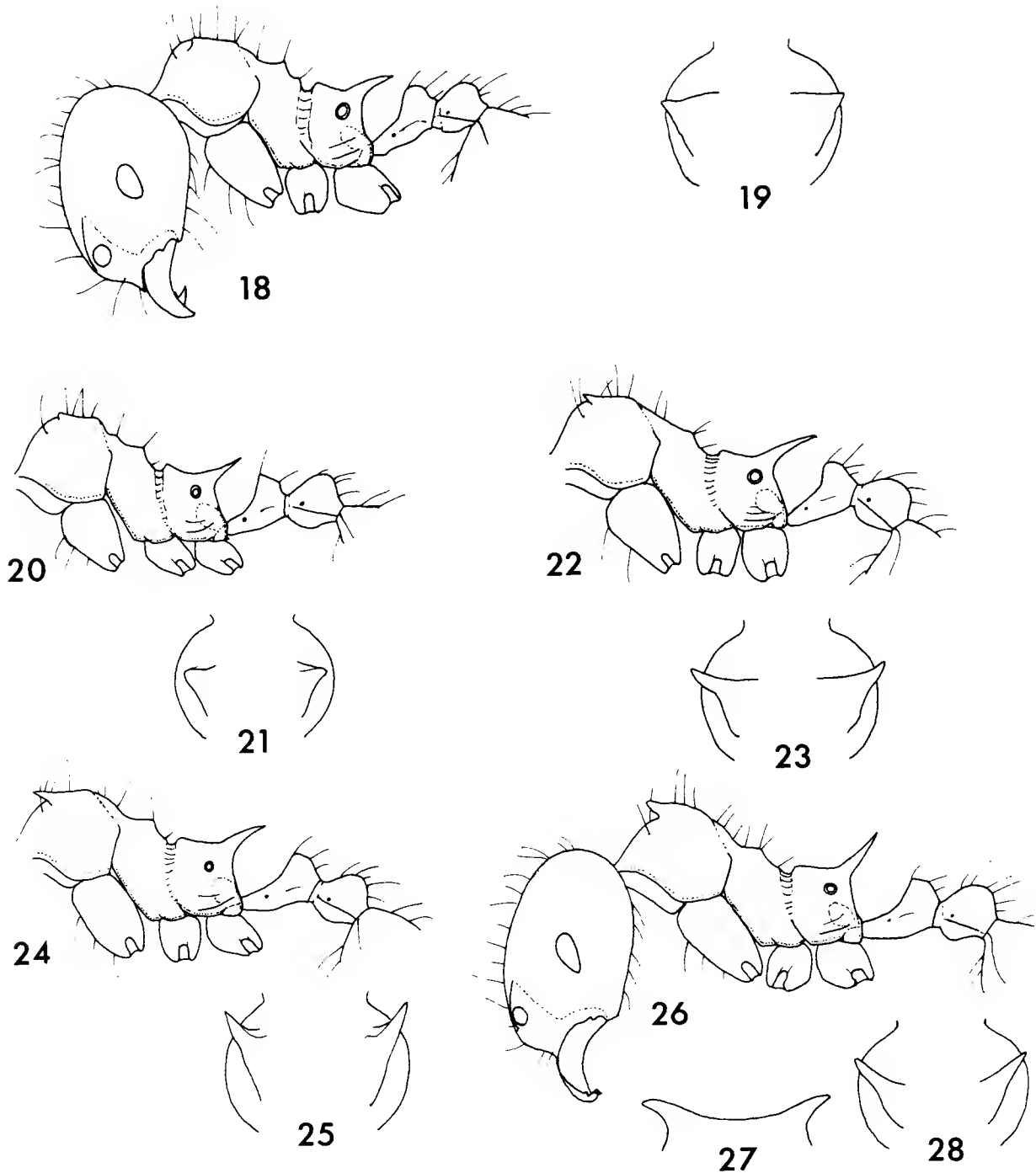
Smallest specimens are more superficially sculptured with clearly shining frons and vertex, although still distinctly reticulate. Some rugulae always occur on the pronotum. In largest specimens rugulae are often more numerous and developed on the pronotum.

Colour from brownish yellow to yellowish brown.

Holotype worker, THAILAND: Khao Sabap Nat. Park 24.ix.1985 (I. Löbl and D. Burckhardt) (MHNG).

Paratype worker, 29 specimens with the same data as the holotype (BMNH; MCZ; MHNG).

*Comments.* Its closest relative appears to be *L. ambiguus*.



**Figs 18–28.** *quadrispinosus* group. 18–19: body profile (18) and dorsal view of the pronotum (19) of *quadrispinosus*; 20–21: alitrunk profile (20) and dorsal view of the pronotum (21) of *taivanae*; 22–23: alitrunk profile (22) and dorsal view of the pronotum (23) of *birmanus*; 24–25: alitrunk profile (24) and dorsal view of the pronotum (25) of *opaciceps*; 26–28: body profile (26), frontal view (27) and dorsal view (28) of the pronotum of *kali*. (Pilosity and sculpture omitted in 19, 21, 23, 25, 27 and 28; minute pilosity and sculpture omitted in 18, 20, 22, 24, and 26).

*L. striatulus* always has one or two longitudinal short rugulae running backward from the insertion of the humeral hair (Fig. 17); these rugulae are always lacking in *L. ambiguus* (Fig. 15). The rugulation of the pronotum in

*L. striatulus* is always more developed than in *L. ambiguus*. Also, *L. striatulus* has the eye slightly larger and nearer to the mandibular insertion, a shallower metanotal groove, a thinner petiolar node, and its average size is smaller.

***L. quadrispinosus* group*****Lophomyrmex birmanus* Emery (Figs 22, 23)**

*Lophomyrmex birmanus* Emery, 1893: 192. Holotype worker, BURMA [=Myanmar]: Carin-Chebà 500–1000 m, xii.1887 (*L. Fea*) (MCSNG) [examined].

*Lophomyrmex burmanus* Emery; Bingham, 1903: 195 [misspelling].

Worker: TL 2.6–3.2, HL 0.66–0.79, HW 0.59–0.74, CI 83–95, SL 0.57–0.64, SI 84–98, PW 0.39–0.50, AL 0.75–0.94, SpL 0.19–0.30 HTL 0.53–0.65, TI 85–93 (44 measured).

With the characters given in the key and the following: Mesonotum in profile with a very low prominence and without a posterior step. Metanotal groove wide and shallow in profile. Propodeal spines in profile quite long and thin, often feebly curved downward. Petiolar node robust and rather rounded in profile.

Clypeus mostly subopaque. Frontal triangle sublucid. Head with a very superficial reticulation, shining. Genae and frontal lobes with some longitudinal rugulae. Pronotum rather smooth, at most as reticulate as the dorsum of the head. Posterior half of the mesonotum, mesopleuron and propodeum, excluding the declivity, with a strong and dense reticulation, subopaque. Petiole and postpetiole feebly reticulate, above all on the nodes. Gaster shining; a very weak reticulation like that of the head is present mostly on the basal half of the first tergite.

Colour from brownish yellow to light brown; often head clearly darker as well as the first gastral tergite, and alitrunk with somewhat shaded areas and bright brownish.

*Material examined.* SRI LANKA: Peradeniya (*C. T. Bingham*). BURMA: Carin Chebà (*L. Fea*); Pegu Yoma (*C. T. Bingham*). THAILAND: Nong hoi (*D. Jackson*); Mae Lang, Tom Lok Pk (*I. Löbl* and *D. Burckhardt*); Mae Hong Son, Tom Lok, 8 km N Mae Lang, 700 m (*I. Löbl* and *D. Burckhardt*); Chiang Mai, Mae nang Kaeo (*I. Löbl* and *D. Burckhardt*); Wab Pang An (*I. Löbl* and *D. Burckhardt*); Doi Pui, 1420 m (*W. L. Brown* and *I. Burikam*); Doi Suthep, 1180 m (*P. Schwedinger*).

***Lophomyrmex kali* sp.n. (Figs 26–28)**

Holotype worker: TL 3.2, HL 0.77, HW 0.70, CI 91, SL 0.70, SI 100, PW 0.47, AL 0.95, SpL 0.23, HTL 0.70, TI 100.

In lateral view the eye is quite elongate; the distance between its anterior point and the mandibular insertion is about equal to the maximum eye length. Pronotal spines in dorsal view with thin divergent apices, and appearing raised above the pronotal dorsum; the borders of the spines are thin and sharp. Pronotal dorsum in frontal view shallowly and evenly concave. Mesonotum in profile with a low but well-defined prominence and without a distinct posterior step. Metanotal groove shallow in profile. Propodeal spines in profile appearing rather long and slightly

(above all the left one) upcurved, gradually tapering toward the apex. Petiole and postpetiole robust. Petiolar node quite distinctly obliquely shortly truncate in profile.

Clypeus finely sculptured, sublucid except for its posteriormost median portion which is smooth. Frontal triangle sublucid. Head shining with a distinct faint honeycomb-like reticulation. Genae with some longitudinal rugulae. Frontal lobes with feebly developed, thinner longitudinal rugulae. Pronotum shining throughout with only a faint reticulation like that of the head. Mesonotum in front of the prominence shining; mesonotum behind the prominence and propodeal dorsum finely reticulate and subopaque. Mesopleurae and propodeal sides with a wider-meshed reticulation. Propodeal declivity only superficially reticulate and shining. Petiole and postpetiole finely reticulate on the sides; their nodes less distinctly so and sublucid. Gaster shining, very superficially reticulate.

Pilosity as usual in the genus. Pubescence poorly developed on the body.

Colour bright brownish yellow, head slightly darker.

Holotype worker, NE INDIA: no further data (*Kurl*) (BMNH).

*Comments.* It could seem unusual to describe a new taxon based on a single worker specimen without precise data of collection. Yet *L. kali* is very distinct within the *quadrispinosus*-group because of its slender appendages (see SI and TI) and other minor peculiar characters. These include the elongate eye whose anterior point is nearer than usual in related taxa to the mandibular insertion, the slightly raised pronotal spines and the bend of the propodeal spines in profile (Figs 26, 27). Its most closely related taxon is *L. birmanus*, but indices and minor features easily allow the separation of the two species.

***Lophomyrmex opaciceps* Viehmeyer stat.n. (Figs 24, 25)**

*Lophomyrmex quadrispinosus* var. *opaciceps* Viehmeyer, 1922: 211. Syntype workers, INDONESIA: Java, Semarang (*H. Overbeck*) (MNHU) [examined].

♣ *Lophomyrmex quadrispinosus* var. *javana* Karavaiev, 1933: 270. Holotype worker, INDONESIA: Java, Tjibodas (IZUAS) [not seen]. *Syn.n.*

Worker: TL 2.5–3.4, HL 0.64–0.84, HW 0.58–0.81, CI 88–96, SL 0.55–0.68, SI 80–92, PW 0.38–0.53, AL 0.71–0.99, SpL 0.18–0.25, HTL 0.51–0.64, TI 79–87 (33 measured).

With the characters given in the key and the following: Mesonotum in profile with a well-developed prominence and a posterior small step. Metanotal groove well defined in profile. Propodeal spines in profile slightly downcurved. Petiolar node rather rounded in profile.

Clypeus subopaque, except for its posteriormost median portion which is shining. Frontal triangle quite dull. Cephalic dorsum usually with longitudinal rugulae throughout.

subopaque to opaque; a reticulate ground sculpture is also present and evident chiefly on the posterior half of the head. Anterior pronotal slope with transverse rugulae, quite distinct in dorsal view. Pronotal dorsum between the spines appearing irregularly sculptured with a fine reticulation and superimposed more or less developed longitudinal rugulae (evident above all near the tips of the spines); a faint longitudinal median carina may also be present. Pronotal sides longitudinally weakly costulate. Smallest specimens have reduced rugulation on the head and pronotum. Mesonotum behind the prominence, mesopleuron, propodeum, excluding the declivity, petiole and postpetiole clearly reticulate and opaque. Gaster faintly reticulate, shining.

Pilosity as usual in the genus. Pubescence quite rich on the posterior half of the first gastral tergite. Smallest specimens have very sparse pubescence.

Colour brownish yellow to light brown, usually with slightly more infuscated cephalic dorsum and gaster.

*Comments.* I was unable to acquire the type-series of *javana* from IZUAS for examination. However, the original description and locality correspond well with the features and distribution of *L. opaciceps*; this species seems to be a Javan endemic. Therefore I propose the synonymy of *javana* with *opaciceps*.

Some series formed by small specimens of *opaciceps* have reduced rugulae and nearly no pubescence on the gaster; but I have not found any consistent character which could suggest a separate specific status for them.

*Material examined.* INDONESIA: Java, Semarang (*H. Overbeck*); Ujung Kulon (*M. W. Moffett*); Karimón (*Dammerman*); Bogor (=Buitenzorg) (*N. A. Kemner*).

***Lophomyrmex quadrispinosus* (Jerdón)** (Figs 2, 3, 7, 18, 19)

*Oecodoma quadrispinosa* Jerdón, 1851: 111. Syntype workers, INDIA [probably lost].

*Pheidole quadrispinosa* (Jerdón); *F. Smith*, 1858: 174.

*Lophomyrmex quadrispinosus* (Jerdón); *Emery*, 1892: 114.

*Lophomyrmex quadrispinosus* var. *taprobanae* *Forel*, 1911: 223. Syntype workers and males. SRI LANKA: vii.10 (*K. Escherich*) (MHNG) [examined]. [Raised to species by *Ettershank*, 1966: 134.] *Syn.n.*

Worker: TL 2.5–3.5, HL 0.67–0.88, HW 0.60–0.84, CI 89–99, SL 0.55–0.69, SI 75–84, PW 0.40–0.60, AL 0.72–1.03, SpL 0.16–0.26, HTL 0.55–0.75, TI 83–94 (93 measured).

With the characters given in the key and the following: Mesonotum in profile with a well-developed prominence and with a clear posterior step, sometimes ridged. Metanotal groove distinctly notched in profile. Propodeal spines in profile slightly bent downward and gradually tapering toward the apex. Petiolar node in profile usually briefly obliquely truncate or subtruncate.

Clypeus sublucid, except for its posteriormost median portion which is shining. Frontal triangle sublucid. Head strongly shining, with very feeble ground sculpture. Genae and frontal lobes more or less longitudinally rugulose. Rarely large specimens with head finely and irregularly longitudinally rugulose and sublucid. Anterior pronotal slope appearing transversely rugulose in dorsal view; the rugulae are stronger at the sides and often fade out at the midline. Pronotal dorsum, between the teeth, faintly reticulate and quite shining. Pronotal sides shining. Mesopleurae and propodeum, except the declivity, reticulate and opaque; mesonotum less distinctly sculptured. Petiole and postpetiole reticulate. Gaster glassy smooth, shining.

Colour bright brownish yellow, cephalic dorsum usually darker, gaster often wholly infuscated, sometimes dark brown.

Female: TL approximately 9.5. Propodeal spines strong, short and with blunt apices. Petiolar node in profile triangular, with a rounded summit.

Rather opaque throughout, with the exception of a central clypeal strip, frontal triangle and mesopleuron which are quite shining. Head with a strong ground reticulation and superimposed longitudinal rugulae more developed on the genae and frons. Scutum densely punctured and reticulate, subopaque with a sublucid midline. Axillae finely reticulate and opaque. Scutellum sublucid. Metanotum and propodeum, excluding the declivity, opaque. Petiole and postpetiole finely reticulate. Gaster densely and finely punctured, sublucid.

Colour dark brown. Wings uniformly moderately infuscated.

Male: TL 6.3–6.5. Very similar to the female in sculpture, pilosity, pubescence, and colour.

Mandibles not serrated. Propodeal teeth very short. Petiolar node in profile thick and low. Rugulae on the head rare. Scutum sublucid, finely punctured. Gaster quite shining.

*Comments.* *L. quadrispinosus* var. *taprobanae* is indistinguishable both in workers and males from ordinary *L. quadrispinosus* specimens.

*Bolton* (pers. comm.) found this species rather abundant in Sri Lanka, where it was foraging on the ground in coconut plantations. It is also easily collected by means of sugar bait.

*Material examined.* SRI LANKA: vii.10 (*K. Escherich*); Maha Oya Dist. (*R. Winney*); Sugarc. Res. Inst.; Katunayaka (*B. Bolton*); Lunuwila C.R.I. (*B. Bolton*); Ratnapura (*E. O. Wilson*); Kandy (*E. O. Wilson*); Polonnaruwa (*K. L. A. Perera*); Laxapathiya nr Moratuwa (*K. L. A. Perera*); Maho (*K. L. A. Perera*); Polonnaruwa. INDIA: Siwalik (*Rogers*); Orissa (*Wroughton*); Calcutta; Nuddea (*F. Smith* coll.), no. 1902-120 (*C. T. Bingham* coll.); Tamil Nadu (*J. Noyes*); specimens without further data (*G. B. King* coll.); Orissa (*Taylor*); Bengal, Barrackpore (*L. H. Weatherill*). BURMA: Rangoon (*C. T. Bingham*).

***Lophomyrmex taivanae* Forel (Figs 20, 21)**

*Lophomyrmex quadrispinosus* subsp. *taivanae* Forel, 1912: 55. Syntype workers, TAIWAN: Kosempo, Taihorin (*H. Sauter*) (BMNH, MHNG) [examined].

*Lophomyrmex taivanae* Forel; Ettershank, 1966: 134 [raised to species].

Worker: TL 2.4–3.1, HL 0.63–0.79, HW 0.56–0.71, CI 88–94, SL 0.49–0.61, SI 84–91, PW 0.38–0.49, AL 0.69–0.88, SpL 0.14–0.23, HTL 0.48–0.61, TI 84–91 (32 measured).

With the characters given in the key and the following: Mesonotum in profile with a well-developed prominence and without a distinct posterior step. Metanotal groove quite notched in profile. Propodeal spines in profile very straight, sharp and not very long. Petiole and postpetiole appearing robust in profile. Petiolar node usually obliquely truncate with a quite distinct angle between its anterior and superior faces.

Clypeus subopaque, except for its posteriormost median portion which is shining. Frontal triangle quite dull. Head rather shining, above all on the frons and vertex; in full-face view the portions contained between the level of the inner eye margin and the frontal lobes appear shagreened and usually a little less shining than the frons. Genae and frontal lobes with fine longitudinal rugulae. Pronotum shining with at most only very superficial reticulation on the dorsum. Mesonotum behind the median prominence, mesopleuron and propodeum, excluding the declivity and part of the dorsum, reticulate and sublucid. Petiole and postpetiole finely reticulate and subopaque on the sides; top of the nodes chiefly smooth and sublucid. Gaster glassy smooth, shining.

Colour from pale yellow or pale brownish yellow to bright brownish yellow; sometimes the head with a more orange tinge and the gaster brown.

**Comments.** The species seems to be a Taiwan endemic and is the sole *Lophomyrmex* known from the island. A worker of *taivanae* labelled 'Palestine' (*Svinsky*) is present in DZTAU. As the distribution of many *Lophomyrmex* species is usually limited, I consider that this specimen is either mislabelled or represents an isolated introduction by man. It should not be included as part of the eastern Mediterranean ant fauna.

**Material examined.** TAIWAN: Kosempo (*H. Sauter*); Taihorin (*H. Sauter*); Taihoku (*J. Sonan*; *R. Takahashi*); Hokuto (*R. Takahashi*); Urai (*L. Gressitt*); Nanshanchi, Nantou (*M. Terayama*).

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